SYMONS'S

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THE EDITORSHIP OF THE METEOROLOGICAL MAGAZINE.

With the present number of the *Meteorological Magazine*, which completes the thirty-fifth volume, my control ends, and I purpose devoting what measure of strength remains to me entirely to the Rainfall Organization. The Editorship of the Magazine will be taken up by my friend and colleague, Hugh Robert Mill, D.Sc., LL.D., who, for nearly 20 years, has been one of the leaders of the science of physiography, and in connection therewith has devoted a considerable amount of attention to Rainfall and Meteorology.

The intimate knowledge of the configuration of the Earth's surface is the true foundation for a comprehensive grasp of the problems of meteorology and we have no doubt that the Magazine, while retaining its special interest in rainfall, will deal more fully with the science in all its branches than it has done in the past.

Symons's Monthly Meteorological Magazine is the only journal in the English language devoted to the subject, which has attained to a ripe age; but it must be confessed that it owes it long life to some extent to its usefulness as the organ of the Rainfall Organization, for had it been obliged to stand alone, it is probable that it would not have received sufficient support to justify its continuance.

Since the lamented death of the Founder and first Editor, a somewhat different policy has been adopted, and several new contributors have been good enough to write for the Magazine. It is hoped that this co-operation will be continued, and that by devoting more attention to current topics and the branches of the science, which are of general interest, a larger circulation will be secured, and that it will be possible to introduce illustrations more frequently.

It is hoped that the readers will favour the Editor promptly with notes of any exceptional phenomena and with criticisms and suggestions which will tend to increase the interest of the Magazine.

THE HEAVY RAINFALL OF DECEMBER 30TH, 1900.

THE last great storm of the nineteenth century was remarkable for the heavy rains which fell in the valley of the Severn and of its two tributary Avons. So far as we can judge from a preliminary inspection of the records, the 30th of December was characterised by unusually prolonged and heavy rains across the whole of Central England, in a broad diagonal belt from the mouth of the Severn to the mouth of the Humber, and damage by floods is reported from many places in this area.

Although the following table is only preliminary, and cannot be regarded as complete, it gives some idea of the heaviest falls during the twenty-four hours from 9 a.m. on Sunday, December 30th, to 9 a.m. on Monday, December 31st.

Table of Rainfall on 30th December, 1900.

	in.
Wilts.	
Mere Vicarage	2·69
Somerset.	
Wells, Deanery Gardens	2·72
Frome, Mells Rectory	2·95
Radstock, Downside College.	2·82
Chewton Mendip, The Priory	2·77
Ston Easton	2·84
E. Harptree, Harptree Court	2·82
Radstock, Camerton Court	2·51
Pensford, Sutton Court	3·48
Batheaston	2·88
Gloucester.	
Badminton	2·75
Berkeley, Castle Gardens	3·14
Chalford, Hyde House	2·90
Cirencester	2·76
,, Further Barton	2·76
Stroud, Stanley Park	3·00
,, Upfield	3·09
Harescombe Grange	2·73
Gloucester, Quedgley House	3·10
,, Birdlip Hill	2·67
Mitcheldean, Blaisdon	3·49
Gloucester, Llanthony Lock	2·71
,,	3·11
,, Lower Barton St.	2·84
,, Churcham	2·82
Cheltenham, Dowdeswell	2·70
,, Hewletts Res.	2·55
,, Sandford	2·57
Winchcombe	3·17
Moreton-in-the-Marsh, Longborough	2·65
Tewkesbury, Upper Lode	3·30
,,	2·88
,, Beckford	3·10
Hereford.	
Ross, Croome Hall	2·75
Upton Bishop, The Baches	2·60
Much Marcle, Claremont	2·75
Worcester.	
Upton-on-Severn	2·90
Evesham	3·14
Great Malvern	2·50
Worcester, Bevere Lock	2·59
,, Hawford Lodge	2·78
Droitwich, Holt Lock	2·50
Bewdley, Winterdyne Gdns.	2·50
Lifford Sewage Works	2·50
Stechford	2·70
Warwick.	
Stratford-on-Avon	3·60
,, ,, ,, Shottery	3·20
Leamington	2·91
,, (Binswood Av.)	2·78
Warwick, Hatton Vicarage	2·84
Kenilworth, The Spring	3·23
Coventry, Priory Row	2·85
,,	2·76
,, Stoke	2·58
,, Kingswood	3·87
,, Keresley Grange.	3·30
Leicester.	
Thornton Reservoir	2·55
Rutland.	
Market Overton	2·85
Monmouth.	
Portskewett, Sudbrook	2·80
Chepstow, Piercefield Park	3·24
,, Mathern Palace	3·05
Llanvihangel Court	2·54

When the figures of the above table are plotted on a map, it becomes clear that all the cases of falls exceeding 3·00 in. lie in

a strip of country stretching from near Bristol and Chepstow to Coventry, a distance of 85 miles in a north-east direction, and it is remarkable that no fall of 3·00 in. or upwards is reported from any station more than 10 miles to the right or left of the straight line joining Avonmouth and Coventry. This belt of heaviest rain covers an area of nearly 1,000 square miles, almost entirely in the valley of the Lower Severn and the Warwickshire Avon, which flow almost exactly along the centre of it—the south-eastern edge of the strip being sharply defined by the steep slope of the Cotswold Hills and the escarpment stretching north-eastward from them. The area of rainfall over 2·50 in. surrounds this belt, and is very much more extensive, appearing to form a great triangle, with its angles near Gillingham, Dorset, Hereford and Melton Mowbray, a total surface of about 3,500 square miles, including the north of Somerset, the west of Wiltshire and Oxford, the east of Monmouth and Hereford, and the whole of Gloucester, Worcester, Warwick and Leicester. The rainfall exceeded 2·00 in. in the twenty-four hours over a wider area, also triangular in outline and measuring altogether about 7,000 square miles. Outside this larger triangle the amount of rainfall diminished rapidly, especially along the northern edge, but a large part of England recorded rain over 1·00 in.

The weather during the 30th is shown by the Meteorological Office Weather Charts to have been under the influence of a cyclone, the centre of which was over the middle of Ireland on the morning of the 30th, and moved south-eastward, passing Bristol a little before 6 that evening, and being in the English Channel on the morning of the 31st. The region of heavy rain thus was successively under the front and the rear of a cyclone in an unusually short time, and the wind, which was blowing from the S.W. on Sunday morning, blew with greater strength from N.E. on Monday morning over the whole area affected by the rains. The recording rain gauges at the Midland Institute, Birmingham, and at West Bromwich, showed that the heaviest fall commenced about 3 p.m., on the 30th, and lasted until midnight.

Many observers have favoured us with notes of the progress of the storm at their stations; and the newspapers have been full of reports of the disastrous floods at Coventry, Stratford-on-Avon, Warwick, Bristol, Leicester, and other places. From our correspon dence we make the following selection :—

Beckford.—The close of the 19th century was marked by the record rainfall of 3·10 in. registered here. It commenced to rain on the 30th December, at 9 a.m., and continued without interruption till 5 a.m. on the 31st. At 4 p.m. the gauge had collected 0·62 in., and 2·48 in. fell between 4 p.m. and 5 o'clock the next morning. You will, doubtless, have records from other places, but from newspaper and private sources I gather that the fall was very general over the midland and south-west districts. At Kenilworth it was 3·17 in., at Evesham 3·14 in., at Beckford 3·10 in., at Winchcombe 3·17 in., at

Gloucester 3·11 in., at Chepstow 3·20 in. The flood in this district was the highest on record, being 9 inches higher than the previously recorded highest on October 1st, 1848.—FREDK. SLADE.

Dollarward, Cirencester.—The rain commenced about 10 a.m., but was not very heavy until 1 p.m.; it was very heavy all afternoon, wind light S.W., S.E., E.; by 10 p.m. 1·19 in. were measured. About that time the wind suddenly rose from the N. and soon blew a severe gale; the barometer, which had fallen to 28·71 in., commenced to rise. Between 12 and 3 a.m. the gale was at its height, and was exceedingly severe, doing much damage. Rain continued all night and appears to have been heaviest from 4 to 6 a.m., accompanied by snow. It had ceased by 9 a.m., and by 2 p.m., 31st, the wind had almost died down. The floods here are the worst ever known. My own guage was blown over in the night.—CHARLES P. HOOKER.

Stratford-on-Avon.—Before sending you the usual returns of rain, I desire to report the marvellous amount that fell on Sunday last, 3·60 ins. On the 26th there fell 0·55, and 0·22 in. during the next three days. The flood here on the 31st was the highest of the century; a board at the mill, which marks the height of floods, shows that it was 6 inches higher than that in 1801, the next highest.

The greatest falls I had registered here previously were on October 24th, 1882, 1·52 inches, and on August 6th, 1898, 1·46 inches. At Moville, in the north of Ireland, I had registered 2·54, November 13th, 1875; and in Londonderry in 1869 there fell on July 16th 2·04, on 20th 0·52, on 21st 0·50, on 23rd 2·15, so the fall of last Sunday far surpasses any I have registered in 40 years.

F. SMITH.

The Spring, Kenilworth.—A very exceptional fall of rain has occurred here. I register for the 24 hours, ending 9 a.m. on the 31st, 3·23 inches. Of this ·38 fell before 4.15 p.m. yesterday, and the remainder (2·85 inches) fell between 4.15 p.m. and 9 a.m. on the 31st.—W. EVANS.

North Cadbury Rectory, Somerset.—A remarkable rain began about 9.30 a.m. on the 30th, and fell steadily at uniform rate till 4.45 p.m., when exactly ·50 in. had fallen. From that time till about 9 p.m. it did not quite leave off, but the rain was very small, and I walked to church at 6.30 and returned at 7.45 without an umbrella.

The barometer, which had been falling steadily all day, reached 29·04 in. just before 6.30, and was at that or at 29·03 in. at 7.45. Wind all day from S.W. But while we were in church the wind increased somewhat, and at the end of the service was blowing in at the N. door, being then N.W., and still increasing.

At 9.30 p.m., or thereabouts, it began raining in earnest, beating on the W. windows, while the barometer showed an inclination to rise.

At 8 a.m., December 31st, the surface of the ground and the trees were dry, with a fairly strong N. wind blowing, and grey sky. But from my window I could see floods to S.W., which are never visible unless they are considerable. Going out on the lawn I found

it to be in no way sloppy, and when I looked into the gauge I was fairly astonished. It had 1·51 in. in it, of which almost all must have fallen between 9.30 p.m. and about 3 or 4 a.m.

At a farmhouse in the neighbourhood, on low ground, the farmer had got up at 3 a.m. to rescue his poultry and cows from the rising flood; he said it was not then raining anything to speak of, and he was of opinion that the flood was at its height some time between 3 and 6, and higher than the flood of February, 1900.

This seems to point to the conclusion that the rain came down pretty hard, but not torrentially, for about five or six hours from 9.30 p.m. But it is clear from the newspapers that this rain was *not* a local one; and you may be glad of these notes of the time when it fell, to aid you in any investigation.

I should emphasize that there were Two rains—one of ·50 in. between 9.30 a.m. and 4.45 p.m.; another of 1·51 in., of which *almost all* fell between 9.30 p.m. and 3 or 4 a.m.

H. A. Boys, F.R.Met.Soc.

In addition to the serious damage which was done in the large low-lying towns of the Severn and Avon valleys, where the rain was the heaviest, the outskirts of the rainy belt also suffered severely; one of the great trilithons at Stonehenge being overthrown by the storm, mainly, it is believed, on account of the washing away of the soil from around the base of the stones.

THE MILD DECEMBER.

Mr. H. Sowerby Wallis thus describes in a letter to *The Times*, of January 2nd, the remarkable features of the last month of the nineteenth century as regards temperature.

Temperature at Camden Square, London, N.W., December, 1900.

	9 a.m.	9 p.m.	Max.	Min.	Mean.
	°	°	°	°	°
Mean Temperature	45·0	46·0	50·1	40·6	45·4
Difference from the average of 40 years	+6·0	+6·4	+6·1	+6·2	+6·2
Highest in 1900	53·6	55·7	56·5	51·1	53·1
No. of days above 50°	6	8	19	3	5

Dealing with the above columns *seriatim*, we find that the mean 9 a.m. temperature was 6°·0 above the average, but it has been exceeded by 45°·4 for December, 1898, and by 46°·1 for December, 1868, while the highest 9 a.m. reading has been exceeded a dozen times.

The mean 9 p.m. temperature was 6°·4 above the average, and has been exceeded only by 46°·4 for December, 1868, but the highest 9 p.m. reading has been exceeded four times.

The mean *maximum* temperature was 6°·1 above the average, and has been exceeded only by 50°·7 for December, 1868, but the highest *maximum* has been exceeded ten times; nevertheless, the number of days on which the temperature exceeded 50° (19) is unprecedented, for there were only 18 such days in 1868 and 17 in 1898.

The mean *minimum* was 6°·2 above the average, and has been exceeded by 40°·8 for 1898 and 41°·0 for 1868, but the highest *minimum* has been exceeded five times.

The mean temperature for the month was 6°·2 above the average, and has been exceeded only by 46°·0 for 1868, but the highest mean was exceeded in both 1868 and 1898. The number of days with mean temperature above 50° (5) was also exceeded in both those years.

From the foregoing it is clear that December, 1900, while it ranks with the mildest of the last half century, was equalled in mildness by December, 1898, and exceeded by December, 1868 :—

Temperature of December at Camden Square, London, N.W.

	9 a.m.		9 p.m.		Maximum.		Minimum.		Mean Temp.
	Mean.	Highest	Mean.	Highest	Mean.	Highest	Mean.	Highest	
	°	°	°	°	°	°	°	°	°
1868.....	46·1	53·5	46·4	56·2	50·7	58·2	41·0	50·8	46·0
1898.....	45·4	54·8	45·7	55·1	49·8	57·1	40·8	53·9	45·4
1900.....	45·0	53·6	46·0	55·7	50·1	56·5	40·6	51·1	45·4

In December, 1868, frost in shade occurred on only one day; in December, 1898, on three days; and in December, 1900, on two days.

The features of the past month were—almost entire absence of frost and an exceptional number of mild days, rather than a few days of remarkably high temperature.

DECEMBER BLOSSOMS.

In connection with the remarkable mildness of December, the following list of the varieties of flowers in full bloom at Farnham Lodge, near Knaresborough, Yorkshire, 170 feet above sea level, is of interest. The list is sent by Mr. R. Elmhurst, and represents a floral census taken by him in his garden on January 1st, 1901.

Marigold.
White Verbena.
Laurustinus.
Blue Gentian.
Christmas Rose.
Carnation.
Polyanthus.
White Primula.
Cowslip.
Pansy.
Wallflower.
Helleboras fœtida.
Winter Jasmine.
Roses, various.
Feverfew.
Chrysanthemums, various.
Arabis.
Rocket.
Potentilla.
Hepatica.
Violet.
Periwinkle.
Orobus Vernus.
Anemone.
Yellow Button (*Pyrethrum sp.*)

ROYAL METEOROLOGICAL SOCIETY.

The monthly meeting of this society was held on Wednesday evening, December 19th, at the Institution of Civil Engineers, Westminster. The President, Dr. C. Theodore Williams, was in the chair.

The following gentlemen were elected Fellows:—Sir C. T. D. Acland, Bart., A. M. Bell, C.E., Captain J. G. Bickford, S. Brocklehurst, Lieut. M. H. Clarke, R.N.R., R. Downs, J. C. Eckersley, E. O. Evans, Captain A. M. Field, R.N., H. D. Gardner, J. Kitching, O. T. Olsen, K. Otani, E. J. B. Sopp, J. R. Tustin, Colonel F. R. W. Sibthorp, and C. L. Weller.

Mr. Henry Mellish, F.R.Met.Soc., read a paper on "The Seasonal Rainfall of the British Isles," which he illustrated with a number of lantern slides. He discussed the rainfall records from 210 stations, for the 25 years, 1866-90, and gave the monthly and seasonal percentages of the mean annual rainfall for each station.

From a consideration of the seasonal charts, Mr. Mellish drew the following conclusions:—

Winter.—In winter the largest percentages of rainfall are found, as a rule, at the wet stations, and the smallest at the dry ones, so that the chart of percentages for this quarter bears a strong resemblance to the chart of mean annual rainfall. This accordingly is the season in which the differences in the actual rainfalls in the different districts are the largest; and this is especially the case in January, which is the wettest month of the year in some of the very wettest districts.

During these three months more than 30 per cent. of the yearly total falls in Cornwall and part of Devon, in the English Lake District, and over a good deal of the west coast of Scotland, and also in the south and west of Ireland, these being the districts in which the wettest month in the year is either December or January. The highest percentage of all, 34 per cent., is found in the Kyles of Loch Alsh; while areas with more than 32 per cent. exist to the north of the Clyde, in the English Lake District, and in the extreme south of Ireland. On the other hand, less than 24 per cent. of the yearly total is recorded over the whole of the central plain and east coast of England, and parts of the east coast of Scotland, a minimum of 19 per cent. being found near Ely, and minima of under 22 per cent. near the estuary of the Forth and in Elginshire. In Ireland a strip with less than 26 per cent. extends from near Parsonstown to the north-east coast. Besides the maxima at wet stations already mentioned, we find in this quarter also the minima, at a few stations in February on the east coast of England.

Spring.—Spring is everywhere the driest quarter, and the percentages are very uniform over the country; rather larger in the east than in the west. The west coast of Great Britain receives

rather less than 18 per cent. of the annual mean, and the central plain and the east coast rather more than 20 per cent., with a local maximum of 22 per cent. in Nottinghamshire. Ireland has about 20 per cent., rather more in the south-east, rather less in the west. During this quarter the driest month of the year occurs at nearly all stations, except a few on the east coast of England, where, as already mentioned, the minimum is found in February, and at other stations in the south-west of England, and on the east coasts of Scotland and Ireland, where the minimum occurs as late as June. Over the greater part of the country, either March or April is the driest month.

Summer.—The chart for the summer months is almost exactly the reverse of the winter one; the highest percentages are now found in the dry districts, and the lowest in the wet ones, but they are, on the whole, slightly lower than in winter. There are now only three stations with 30 per cent. of the total fall, one near Ely (where we found the minimum in winter), and two near Edinburgh. The central plain, and parts of the east coast of England and Scotland, receive more than 26 per cent.; while the only districts with less than 20 per cent. are those where we found the maximum in winter, viz.—Cornwall, the English Lake District, and some parts of the west of Scotland, the minimum being rather under 18 per cent. in the Kyles of Loch Alsh, where very nearly twice as much rain falls in the three winter months as in the three summer ones. In Ireland the line of 26 per cent. occupies nearly the same place as in winter, but it now encloses an area of maximum, the percentage falling to about 20 on the south coast. This quarter includes months with extremes of rainfall at comparatively few stations; the districts with a minimum in June have already been mentioned; the maximum occurs in July or August at only a few places in the east of England and Scotland.

Autumn.—As the spring is everywhere dry, so is the autumn everywhere wet, and there is little difference in the proportion of the annual total which falls in the different districts. In Great Britain the percentage is slightly larger on the coasts, and especially on the west coasts, than inland, the minimum, under 28 per cent., being found near Bedford, and also in the estuaries of the Forth and of the Tay, while the maximum, 34 per cent., occurs in the Orkneys. In Ireland the values are rather below 28 per cent. in the south-east, and above this figure in the north-west. In no district is the driest month found in this quarter, while the maximum occurs in either September, October, or November over the whole country, except central and western Scotland, the south of Ireland, and a few small districts in England.

After some remarks on the percentages of rain falling in each month of the year at several typical stations, Mr. Mellish said:

"As regards the relation between the amount of rain which falls in the wettest and the driest month at any station, it seems to be

generally the case that the range is larger for wet stations than for dry ones; but this rule is by no means universal, and has some well-marked exceptions at some of the dry stations. Thus, Ely and Nairn are among the driest stations in England and Scotland respectively, and at each the ratio between the rainfall in the wettest and the driest month is large. However, to put it generally, we may say that in wet districts rather more than twice as much rain falls in the wettest month as in the driest, and in dry districts rather less than twice."

In the discussion which followed the reading of this paper, Mr. F. Gaster said that the irregularities in the monthly rainfall were no doubt due to the varying distribution of atmospheric pressure. In the wet districts, which were mostly mountainous, it was hardly to be wondered at that the winter rainfall was greatest. In the drier quarters the summer maximum was, in his opinion, largely due to thunderstorm disturbances.

Mr. Sowerby Wallis said he felt much indebted to Mr. Mellish for what he considered an exhaustive discussion of the subject, although the author did not call it so. In the two diagrams exhibited, drawn from Bartholomew's "Atlas of Meteorology," of the driest and wettest months, he thought the values would be greatly modified, if a longer period than 25 years had been available.

Mr. Hopkinson said that he had collected records of the monthly rainfall from 288 stations, in England alone, for the 10 years 1881-90. These records give a mean annual fall of 31·58 ins.; the seasonal percentages being, winter 24 per cent., spring 21 per cent., summer 25 per cent., and autumn 30 per cent.

Mr. Eaton said that the Dorset rainfall observations, taken since 1848, which he had discussed at length, proved that a period of 25 years was hardly long enough to give definite results of the monthly distribution of the rain.

Dr. H. R. Mill said that he considered the selection of the stations to be discussed was of great importance in all rainfall work. It was important that they should be chosen so as to represent proportionally the different rainfall divisions of the district in question, though he confessed that it would be very difficult to do this.

After some remarks by Mr. Bayard, Rev. Dr. J. D. Parker, and Captain Carpenter, Mr. Gaster urged the desirability of taking the different types of weather, such as that associated with south-west winds, and comparing them with periods of north-east winds, instead of holding hard and fast to the arbitrarily chosen calendar months.

Mr. Mellish, in reply, said that he could not help thinking that, for a discussion of the causes of the distribution of rainfall, it would be better to deal with individual months, or shorter periods, rather than with averages of a number of years. There was a difficulty in using a greater number of years, as the longer the period, the fewer the stations available.

THE INTERNATIONAL METEOROLOGICAL COMMITTEE.

The report of the meeting of the International Meteorological Committee, held at St. Petersburg from September 2nd to 7th, 1899, has just been issued by the Meteorological Office.

The following were the principal subjects considered :—

1. Report of Professor Rücker on Terrestrial Magnetism and Atmospheric Electricity.
2. Report of M. Hildebrandsson on Clouds.
3. Report of M. Hergesell on Balloon Ascents.
4. Report of M. Violle on Radiation and Insolation.
5. Is it desirable that the Committee should deal with Seismological Observations? (M. Rykatcheff.)
6. Antarctic Exploration. (Dr. von Bezold.)
7. Centres of Atmospheric Action. (M. Hildebrandsson.)
8. Definition of the Meteorological Day. (M. Rykatcheff.)
9. Instructions for the use of Sunshine Recorders. (M. Rykatcheff.)
10. Rules for the Determination of the Temperature of the Soil. (M. Rykatcheff.)
11. Precautions to be Adopted in the use of Alcohol Thermometers. (M. Rykatcheff.)
12. The Symbol to Indicate Low Fog. (M. Rykatcheff.)
13. Further Definition of the Meaning of the Symbols Employed to Indicate Thunderstorms. (M. Rykatcheff.)
14. Protection of Magnetic Observatories against Electric Supply Currents. (Dr. von Bezold.)
15. Proposal for the Publication, in a Special Form, of the Diurnal March of Temperature for each Country. (Dr. Hann.)
16. The Importance of Actinometric Observations. (Dr. Hann.)
17. The Installation of Anemometers in the Open Country under Identical Conditions. (M. Teisserenc de Bort.)
18. The Use of Carrier Pigeons by Transatlantic Steamships for Transmitting Information about the Weather off the European Coasts. (M. Teisserenc de Bort.)
19. Publication Fortnightly, or every Ten Days, of Recent Reports of Weather in the Atlantic Portion of the Northern Temperate Zone. (Dr. von Bezold.)
20. The Desirability of Restricting the Use of the Psychrometer as far as possible, and of Recommending the Use of the Hair Hygrometer for Regular Hygrometric Observations. (Dr. Pernter.)
21. Establishment of a Telegraph Cable to Iceland. (M. Paulsen.)
22. International Ten-day Weather Reports. (MM. von Bezold and Neumayer.)

The report on balloon ascents details the International simultaneous ascents up to the date of the meeting, and contains a somewhat full discussion as to the requirements for successful work, both as regards instruments and general equipment, with special details of the observations at Trappes by M. Teisserenc de Bort, at Blue Hill by Mr. A. Lawrence Rotch, and at Berlin by Dr Assmann.

The expression, "Centres of Atmospheric Action," may not convey much meaning to some of our readers, but the following extracts will make it clear, and give an outline of what is proposed:—

"It is evident that we shall never discover the laws which govern the general movements of the atmosphere if the only observations we make on the Earth's surface are those in certain civilised countries. . . . .

"On any isobaric chart for any month there will be found determinate regions of barometrical maxima and minima. The most constant maxima are located over the oceans to the north and south of the equator, near the Tropics, and the most important minima on the oceans near the Arctic and Antarctic circles. On the continents of the temperate zones we have maxima in winter and minima in summer. These maxima and minima have been termed by M. Teisserenc de Bort *centres of action*. In fact, thanks to his investigations and the more recent work of MM. van Bebber and Köppen, we know that a certain relation exists between the general character of the weather of a season in Europe and the variations in the barometrical heights at the surrounding centres of action; that is to say, in Iceland, at the Azores, and in Siberia. A season has a different *type* according to whether Europe is under the influence of one or other of these centres of action. If the depression over the sea near Iceland extends in winter over the whole north-west of Europe, we have a mild and rainy winter, while the winter is severe if either the Azores maximum or that from Siberia extends over Europe, and so on. It seems that direct relations exist between all the centres of action over the globe."

This appears to us, as regards practical meteorology, one of the most promising fields of research, for if we can prove a connection between the conditions existing in different regions, as indicated above, or in the relation between Nile floods and monsoon rains in India, we shall have made a great step towards finding the cause of both. There may be difficulty in finding funds for meteorological observatories in remote regions, but with such observatories, to give a broad view of the horizontal distribution of atmospheric phenomena, and with kite and balloon observations, to study its vertical variations, meteorology should make greater advances in the coming century than it has done in the past.

M. Violle's report on radiations is a full discussion of the advances made up to 1898 in methods and apparatus for measuring solar radiation. The various instruments are described and criticised, and the list of references to original sources of information is exceptionally complete.

The meeting of the International Committee at St. Petersburg was, from several causes, a small one; but the subjects dealt with were of great importance, and the decisions arrived at seem likely to advance the scientific study of meteorology.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, JULY, 1900.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	TotalRain. Depth.	TotalRain. Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
London, CamdenSquare	95·2	16	44·5	8	80·7	57·6	..	...	137·1	43·9	1·50	7	4·2
Malta	92·1	4	59·1	12	88·0	70·6	68·4	70	149·0	53·0	·00	0	0·8
Cape of Good Hope	72·8	7	38·5	24	62·8	48·5	47·8	81	...	...	4·77	17	6·2
Mauritius	75·2	8	57·6	30	73·3	62·4	58·7	75	135·3	48·2	2·29	18	5·3
Calcutta	97·0	1	75·2	20	89·5	79·2	78·7	85	153·4	74 0	8·68	20	2·3
Bombay	89·2	5	74·2	13	86·5	79·3	77·8	85	143·4	71·8	25·75	28	8·5
Ceylon, Colombo	89·1	6	73·0	24	86·3	76·5	74·2	84	146·0	72·0	6·77	17	5·4
Melbourne	64·8	20	30·2	3	54·7	41·7	45·5	80	118·0	24·0	1·07	10	6·6
Adelaide	66·1	29	35·4	19	57·8	43·5	43·4	79	134·0	28·3	1·55	14	6·4
Sydney	66·1	25	39·3	17	57·1	45·3	43·2	83	105·9	31·2	13·21	12	4·9
Wellington	61·0	29*a*	34·0	13*b*	54·1	41·6	38·3	71	98·0	23·6	8·09	18	4·7
Auckland	63·0	17	40·0	10	57·7	47·0	41·6	68	128·0	36·0	3·68	23	6·1
Jamaica, Halfway Tree	94·0	18	70·0	25	88·6	72·5	70·0	75	...	...	2·34	8	4·4
Trinidad	89·0	sev.	69 0	23	87·0	71·6	74·4	85	168·0	65·0	7·95	22	...
Grenada	85·8	18	67·0	13	83·7	72·1	72·4	80	160·5	...	8·81	27	5·0
Toronto	94·4	6	48·1	1	80·9	58·0	58·8	72	112·4	42·8	2·73	12	4·8
New Brunswick, Fredericton	85·7	24	45·0	1	75·8	53·9	55·1	65	...	...	2·13	15	5·6
Manitoba, Winnipeg	86·2	20	41·0	25	78·1	51·7	...	...	...	...	4·06	10	4·8
Victoria, British Columbia	79·6	31	50·0	10	67·3	52·9		...	...	...	·40	3	4·0

a—and 31. *b*—and 19, 20.

REMARKS.

MALTA.—Adopted mean temp. 78°·6, or 1°·3 above average. Mean hourly velocity of wind 7·9 miles, or 0·2 above average. L on 1st, 13th, 18th. J. F. DOBSON.

Mauritius.—Mean temp. of air 1°·2, and of dew point 0°·7, below, and rainfall ·02 in. above their respective averages. Mean hourly velocity of wind 10.9 miles, or 1·0 below average; extremes, 24·3 on 3rd and 1·6 on 10th. T. F. CLAXTON.

CEYLON, COLOMBO.—Mean temp. of air 0°·5 below, of dew point 0°·2 above, and rainfall 2·39 in. below, their respective averages. Mean hourly velocity of wind 10 miles; prevailing direction S.W. L was seen on five days. H. O. BARNARD.

Adelaide.—Very cloudy month, but rain though falling on 14 days was light, the total being 1·03 in., less than the average. Seventeen hours less sunshine than the average of previous years. Mean temp. 50°·6, or 0°·9, below average. C. TODD, F.R.S.

Sydney.—Temperature 1°·2 below, humidity 6·0 above, and rainfall 8·72 in. above, their respective averages. A heavy snowfall on 5th covered the central highlands over an area 180 miles N. and S. and 130 E. and W., the Western Railway for 80 miles was blocked by S. This storm was more severe than any ever recorded here. It was caused by the meeting of warm tropical rains coming southwards and an intensely cold southerly wind, the most severe on record. H. C. RUSSELL, F.R.S.

Wellington.—Heavy rain early in the month, and generally showery up to 19th; generally cold weather and frosty nights during the latter part; winds variable. Mean temp. 0°·2 above, and rain 1·75 in. above the averages. R. B. GORE.

Auckland.—Barometer and mean temperature close to the average of the previous 32 years; rainfall rather more than 1·00 in. below, the average. T. F. CHEESEMAN.

Trinidad.—Rain 1·50 inches below the 30 years average. J. H. HART.

SUPPLEMENTARY TABLE OF RAINFALL, DECEMBER, 1900.

Div	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
I.	Uxbridge, Harefield Pk..	3·12	XI.	Builth, Abergwesyn Vic.	12·20
II.	Dorking, Abinger Hall .	3·53	,,	Rhayader, Nantgwillt ...	9·12
,,	Birchington, Thor	2·15	,,	Lake Vyrnwy	9·75
,,	Hailsham	4·67	,,	Corwen, Rhug	4·88
,,	Ryde, Thornbrough	...	,,	Criccieth, Talarvor	4·82
,,	Emsworth, Redlands ...	3·46	,,	I. of Anglesey, Lligwy..	6·68
,,	Alton, Ashdell	4·85	,,	I. of Man, Douglas	5·04
III.	Oxford, Magdalen Coll..	3·27	XII.	Stoneykirk, Ardwell Ho.	4·90
,,	Banbury, Bloxham	3·65	,,	New Galloway, Glenlee	11·09
,,	Northampton, Sedgebrook	3·56	,,	Monnaive, Maxwelton Ho.	8·38
,,	Alconbury	...	,,	Lilliesleaf, Riddell	4·61
,,	Wisbech, Bank House...	2·81	XIII.	N. Esk Res. [Penicuick]	8·75
IV.	Southend	1·50	XIV.	Glasgow, Queen's Park..	7·71
,,	Colchester, Lexden	2·59	XV.	Inveraray, Newtown ...	14·81
,,	Saffron Waldon, Newport	2·64	,,	Ballachulish, Ardsheal...	16·15
,,	Rendlesham Hall	2·56	,,	Islay	8·14
,,	Scole Rectory	...	XVI.	Dollar.....	5·99
,,	Swaffham	2·94	,,	Balquhidder, Stronvar...	19·44
V.	Salisbury, Alderbury ...	4·57	,,	Coupar Angus Station...	3·96
,,	Bishop's Cannings	5·00	,,	Blair Atholl	6·03
,,	Blandford, Whatcombe .	6·93	XVII.	Keith H.R.S.....	3·28
,,	Ashburton, Holne Vic...	11·13	,,	Forres H.R.S.	3·60
,,	Okehampton, Oaklands.	7·50	XVIII.	Fearn, Lower Pitkerrie..	3·84
,,	Hartland Abbey	5·61	,,	S. Uist, Askernish	6·66
,,	Lynton, Glenthorne ...	9·60	,,	Invergarry.....	15·18
,,	Probus, Lamellyn	6·42	,,	Aviemore, Alvie Manse.	5·21
,,	Wellington, The Avenue	5·33	,,	Loch Ness, Drumnadrochit	8·78
,,	North Cadbury Rectory	5·50	XIX.	Invershin	5·93
VI.	Clifton, Pembroke Road	5·97	,,	Durness.....	9·12
,,	Ross. The Graig	5·55	,,	Watten H.R.S.....	2·86
,,	Wem, Clive Vicarage ...	3·60	XX.	Dunmanway, Coolkelure	13·68
,,	Wolverhampton, Tettenhall	3·48	,,	Cork, Wellesley Terrace	5·98
,,	Cheadle, The Heath Ho.	4·81	,,	Killarney, Woodlawn ..	11·08
,,	Coventry, Priory Row ..	5·36	,,	Caher, Duneske	4·34
VII.	Market Overton	4·90	,,	Ballingarry, Hazelfort...	3·90
,,	Grantham, Stainby	4·02	,,	Limerick, Kilcornan ...	4·40
,,	Horncastle, Bucknall ...	3·12	,,	Miltown Malbay	6·11
,,	Worksop, Hodsck Priory	3·00	XXI.	Gorey, Courtown House	3·20
VIII.	Neston, Hinderton	2·66	,,	Moynalty, Westland ...	4·48
,,	Southport, Hesketh Park	3·51	,,	Athlone, Twyford	4·43
,,	Chatburn, Middlewood.	5·76	,,	Mullingar, Belvedere ...	4·83
,,	Duddon Val., Seathwaite Vic.	14·34	XXII.	Woodlawn	5·94
IX.	Melmerby, Baldersby ...	2·29	,,	Crossmolina, Enniscoe ..	9·30
,,	Scalby, Silverdale	3·52	,,	Collooney, Markree Obs.	5·19
,,	Ingleby Greenhow Vic..	2·28	XXIII.	Enniskillen, Model Sch.	5·12
,,	Middleton, Mickleton ...	3·70	,,	Warrenpoint.....	4·18
X.	Haltwhistle, Unthank H.	4·64	,,	Seaforde..	5·26
,,	Bamburgh	2·04	,,	Belfast, Springfield	3·47
,,	Keswick, The Bank.....	11·73	,,	Bushmills, Dundarave..	4·16
XI.	Llanfrechfa Grange	8·10	,,	Stewartstown	4·15
,,	Llandovery	8·74	,,	Killybegs	6·61
,,	Castle Malgwyn	6·32	,,	Horn Head	5·90
,,	Brecknock, The Barracks	...			

DECEMBER, 1900.

Div.	STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1880-9.	Greatest Fall in 24 hours. Dpth	Date	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Max. Date	Min. Deg.	Min. Date.	No. of Nights below 32°. In shade.	On grass.
		inches.	inches.	in.								
I.	London (Camden Square) ...	2·55	+ ·48	·71	30	21	56·5	12	28·3	23	2	9
II.	Tenterden	3·48	+ ·85	·80	30	22	55·5	5	29·5	23	2	10
,,	Hartley Wintney	3·15	...	·75	30	26	55·0	9*b*	30·0	23*e*	4	9
III.	Hitchin	2·54	+ ·51	·78	30	20	55·0	12	24·0	22	2	...
,,	Winslow (Addington)	3·02	+ ·57	1·28	30	21	55·0	5, 12	22·0	23	5	9
IV.	Bury St. Edmunds (Westley)	2·54	+ ·30	·93	30	21	54·0	18	27·0	22	...	...
,,	Norwich (Brundall)	2·98	...	1·23	30	22	57·0	12	25·8	23	4	11
V.	Winterbourne Steepleton ...	7·26	...	2·02	30	26	54·9	5	28·1	1	7	13
,,	Torquay (Cary Green)	5·91	...	·78	30	26	56·3	4	33·7	3	0	3
,,	Polapit Tamar [Launceston]..	5·82	+ 1·59	1·18	30	25	56·0	5	26·6	1	6	...
VI.	Stroud (Upfield)	6·54	+ 4·09	3·09	30	23	54·0	8*c*	29·0	22	3	...
,,	Church Stretton (Woolstaston)	3·89	+ ·84	1·07	30	18	56·0	12*d*	31·0	23	1	8
,,	Worcester (Diglis Lock)	4·63	+ 2·65	1·81	30	26	...	...	...	...	...	...
VII.	Boston	3·80	+ 1·95	1·75	30	14	55·0	15	25·0	23	5	...
,,	Hesley Hall [Tickhill].....	2·78	+ ·80	·95	30	17	60·0	11	27·0	23	2	...
,,	Breadsall Priory	4·19	...	1·75	30	21	...	...	...	...	...	...
VIII.	Manchester (Plymouth Grove)	4·28	...	·58	5	21	...	...	...	...	...	...
IX.	Wetherby (Ribston Hall) ...	2·92	+ ·48	·70	5	17	...	...	...	...	...	...
,,	Skipton (Arncliffe)	8·77	+ 1·96	1·29	3	30	...	...	...	...	...	...
,,	Hull (Pearson Park).	3·00	+ ·73	·90	30	18	56·0	20	24·0	23	4	5
X.	Newcastle (Town Moor)	1·82	— ·48	·57	3	12	...	...	...	...	...	...
,,	Borrowdale (Seathwaite).....	27·15	+12·34	5·32	14	28	54·5	20	32·3	30	0	...
XI.	Cardiff (Ely).....	7·17	+ 2·62	1·77	30	26	...	...	...	...	...	...
,,	Haverfordwest	6·90	+ 1·91	·81	3	24	55·6	20	31·2	19	4	11
,,	Aberystwith (Gogerddan) ...	5·58	+ ·70	·73	30	19	54·0	25	...	...	...	...
,,	Llandudno.....	2·66	— ·30	·51	27	16	62·0	20	35·5	23	0	...
XII.	Cargen [Dumfries]	8·92	+ 4·90	1·04	19	25	54·0	12	32·0	29*a*	2	...
XIII.	Edinburgh (Blacket Place)...	4·43	...	...	...	...	57·1	8	32·4	30	0	...
XIV.	Colmonell	6·01	...	·85	27	21	56·0	8	32·0	7	1	...
XV.	Tighnabruaich	9·51	...	1·38	5	28	50·0	12*d*	32·0	3*f*	3	...
,,	Mull (Quinish).....	...	...	...	...	...	...	...	...	...	...	...
XVI.	Loch Leven Sluices	5·70	+ 2·39	1·20	6	21	...	...	...	...	...	...
,,	Dundee (Eastern Necropolis)	3·65	+ 1·57	·90	5	24	56·4	20	30·0	29	3	...
XVII.	Braemar	5·31	+ 2·84	·81	20	27	57·4	25	24·8	5	8	16
,,	Aberdeen (Cranford)	3·44	...	·59	27	23	54·0	8, 11	25·0	4	8	...
,,	Cawdor (Budgate)	5·11	+ 2·65	·54	28*a*	24	...	...	...	...	...	...
XVIII	Strathconan [Beauly]	11·55	+ 5·78	1·70	21	20	..	...	...	...	...	...
,,	Glencarron Lodge.....	16·91	...	1·58	19	29	56·0	26	27·0	4	6	...
XIX.	Dunrobin	5·19	+ 1·82	·52	17	22	54·5	17	31·0	4	5	...
,,	S. Ronaldshay (Roeberry) ...	4·20	+ ·54	·43	7	29	53·0	20	38·0	6	0	...
XX.	Darrynane Abbey.....	4·84	...	1·05	1	30	...	...	...	...	...	...
,,	Waterford (Brook Lodge) ...	5·37	+ 1·73	·78	19	23	55·0	20	27·0	23	6	...
,,	Broadford (Hurdlestown) ...	4·76	...	·70	25	28	...	...	...	...	...	...
XXI.	Carlow (Browne's Hill)	4·26	+ 1·14	·61	19	22	...	...	...	...	...	...
,,	Dublin (Fitz William Square)	1·60	— ·56	·27	5	20	59·8	20	31·8	23	1	5
XXII.	Ballinasloe	5·47	+ 2·05	·69	4	27	53·0	20	26·0	23	11	...
,,	Clifden (Kylemore)	8·77	...	1·33	27	27	...	...	...	...	...	...
XXIII	Waringstown	2·99	— ·05	·44	3	13	...	...	...	...	...	...
,,	Londonderry (Creggan Res.).	5·61	+ 1·40	·51	3	28	...	...	...	...	...	...
,,	Omagh (Edenfel)	5·04	+ 1·36	·64	3	25	56·0	21	29·0	23	6	10

ENGLAND. WALES. SCOTLAND. IRELAND.

+ Shows that the fall was above the average ; — that it was below it.

a—and 30. *b*—and 12, 25. *c*—and 20, 25. *d*—and 20. *e*—and 24. *f*—and 28, 30.

METEOROLOGICAL NOTES ON DECEMBER, 1900.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm: R for Rain; H for Hail; S for Snow.

ENGLAND.

TENTERDEN.—Remarkably warm; temp. above 50° in the shade on 18 days, and calceolarias and roses in bloom at the end. There was no rise of water in the well, but ponds filled up some inches. Duration of sunshine, 37 hours. Fog on 2 days. Solar halo on 22nd.

HARTLEY WINTNEY.—An abnormally mild month, with R on every day except five, and the total ·59 in. above the average. The wind was S. to S.W. on 26 days; there were gales on 20th, 28th and 31st. Dense fog on 23rd and 24th. Ozone on 12 days, with a mean of 4·4. Daisy, japonica and Christmas rose in flower on 4th.

WINSLOW, ADDINGTON.—Generally open and mild weather for the time of year. On two days only was the max. temp. below 40°, and on 19 days it was between 50° to 55°. Strong gale on 28th, with bar. 28·876 in. (corrd.) at 9 a.m. Great storm of wind and R on 30th and 31st, causing the brooks to overflow the meadows. Fog on 10th and 24th.

BURY ST. EDMUNDS, WESTLEY.—A very mild month, with rapid variations of bar. Southerly winds on 24 days.

NORWICH, BRUNDALL.—Exceedingly mild, the mean temp. being almost identical with that of December, 1898, which was the mildest since 1868. The temp. exceeded 50° on 15 days, and there was but little frost. The R on 30th was the heaviest fall here since June, 1898, and has only twice been exceeded in 10 years. N.E. gale on 31st.

WINTERBOURNE STEEPLETON.—Very mild, the mean temp. being 44°·7. The min. temp. on grass was specially high, the mean being 36°·3. Although R fell on 26 days, the amount was not excessive until the latter part of the month, R fell each day after the 18th, the total for the 14 days being 4·79 in.; of which 2·02 in. fell on 30th. L on 19th.

TORQUAY, CARY GREEN.—R 2·24 in. above the average. Mean temp. 47°·8, or 4°·5 above the average. Duration of sunshine 16 hours 5 mins. below the average; 15 sunless days. Mean amount of ozone, 5·7; greatest, 8·0 on 6th with W.S.W. wind, and on 31st with N.W. wind; least, 0·5 on 2nd, with N. wind.

POLAPIT TAMAR [LAUNCESTON].—Particularly wet and rather stormy. Temp. generally unseasonably high. Gales on 19th, 20th and 28th. H on 20th, 21st and 28th.

STROUD, UPFIELD.—S.W. gales on 5th, 27th and 30th. The R on the 30th amounted to 47 per cent. of the total for the month.

BREADSALL PRIORY.—Terrible storm on 30th, followed by floods all over the district.

ARNCLIFFE VICARAGE.—An exceedingly wet month. In October, November and December 25·88 in. of R fell.

SEATHWATE.—On seven days more than an inch of R fell, on five days more than two inches, and on three days more than three inches.

WALES.

HAVERFORDWEST.—A stormy and wet month, very mild with only one bright day. Gales occurred on 14 days, that on 27th and 28th being the heaviest for several years, and it causing much damage throughout the county on 28th. The R for the year exceeded the average of 50 years by 3·60 in.

ABERYSTWITH, GOGERDDAN.—Very mild and showery throughout, with very little sunshine.

SCOTLAND.

CARGEN [DUMFRIES].—One of the wettest Decembers on record. T on 3rd.

EDINBURGH, BLACKET PLACE.—Very wet and sunless. Mean temp. 44°·3, being the highest in December since 1857, when it was 46°·5. No frost recorded. Heavy S.W. gale on 20th. Solar halos on 4 days, lunar halos on 2.

COLMONELL, CLACHANTON.—R ·88 in. above the average. Mean temp. 45°·5, or 8°·1 above, the average of 24 years.

TIGHNABRUAICH, CRAIGANDARAICH.—The temp. was above the average, and the R the heaviest in any month of the twelve. Total for the year, 66·24 in.

ABERDEEN, CRANFORD.—Very fine for December, the wind being S.W. and W. for the most part.

IRELAND.

DARRYNANE ABBEY.—Mild, but wet and stormy. The strongest gale for years occurred on the night of the 28th. R for the year 40·53 in., being a good deal below the average.

WATERFORD, BROOK LODGE.—Storms from S.W. on 11th, 20th and 28th. H showers on 25th.

BROADFORD, HURDLESTOWN.—A wet month, but mild. R 1·29 in. above, and rainy days 6 above, the average of 16 years. S.W. gale on 19th and 20th; N.W. on 27th and 28th. Fog on 18th and 27th.

DUBLIN, FITZWILLIAM SQUARE.—Like December, 1899, it was unsettled, dull and wet, but warm. There was an almost constant prevalence of S.W. winds, which blew at frequent intervals with gale force, and on 20th and 28th reached nearly hurricane velocity. To these winds the remarkably high temp. is chiefly to be attributed. Mean temp. 47°·1, or 5°·8 above the average. High winds on 18 days, attaining the force of a gale on 8. Fog on 6 days. L on 20th.

OMAGH, EDENFEL.—Mild, wet and unsettled, with temp. and R much above the average. The most violent gale since that of December 21st, 1894, took place on 20th and 21st, attended by great damage to trees and buildings, although somewhat less than in 1894; and less than at the stations to N. and E. of Edenfel.